# CLAIMS

Device for controlling the melting of the glass batch in a glass melting furnace, which automatically carries out all or some of the set of operations for controlling the operating parameters of the furnace as well as all or some of the set of operations for operating the furnace actuators, on the basis of the strategies that an operator carrying out these operations manually would employ, this device comprising :

- an analysis and control device, of the fuzzy-controller type, using a control algorithm of the fuzzy-logic type which receives all the information relating to the operation of the furnace coming from the sensors and from the detection means provided on this furnace, as well as the set point values input manually by the operators, this control algorithm delivering control signals to the various actuators and control means of the furnace ; and

- a predictive system, of the neural- and/or fuzzy-type which, depending on the state of the furnace and on the information about the change in production over time, defines the various set point values to be assigned to all the furnace actuators, so as to ensure optimum operation for each production phase, the said set point values constituting input values for the fuzzy-logic algorithm which controls the furnace.

2.      Control device according to Claim 1, furthermore including a learning or computing device which is used during the learning phase of the neural- and/or fuzzy-type predictive system, i.e. during the phase of acquisition of the operating laws of the furnace.

3.      Control device according to Claim 2, wherein the learning or computing device uses a computer model of the numerical-model type, making it possible to define the laws governing the operation of the furnace, either from the learning phase of the said predictive system, on the actual furnace, or by simulating the operation of the furnace using a mathematical model.

4.    Control device according to Claim 1 further including a means for the acquisition and processing of the image of the inside of the furnace, operating in the visible, infrared or other spectrum, the said means possibly consisting of one or more video cameras positioned in the furnace in order to observe zones corresponding to a phenomenon relating to the melting and/or to the refining of the glass, the images thus obtained then being processed so as to obtain information relating to the observed phenomenon, this information being shaped for the purpose of being introduced as input data for the furnace control algorithm, so as to monitor and control the observed phenomenon.

5.    Control device according to Claim 4, wherein said phenomenon observed by the means for acquisition and processing of the image of the inside of the furnace is the distribution of the glass batch fed into the furnace, of the position of the batch piles and of their speed, as well as various parameters relating to the appearance of the batch as it melts on the surface of the glass melt.

6.    Control device according to Claim 4, wherein said phenomenon observed by the means for acquisition and processing of the image of the inside of the furnace is the shape and the distribution of the flames from the burners inside the furnace, so as to control the distribution of thermal power and to limit the wear of the refractories, especially of the walls and the crown of the furnace.

7.    Control device according to Claim 4, wherein said phenomenon observed by the means for acquisition and processing of the inside of the furnace is the movement of the convection currents in the glass melt, especially for the purpose of optimizing the melting and/or refining of the said glass in order to control its quality and to limit the wear of the refractories making up the tank for holding the glass in the melting furnace.

8.    Control device according to Claim 4, wherein the phenomenon observed by the means for acquisition and processing of the image of the inside of the furnace is the operation of the bubblers.

9.    Control device according to claim 1, wherein the predictive system of the fuzzy-logic or neural type is designed so as to deliver information used by the fuzzy controller for defining the set points that have to be applied to the

various actuators for operating and controlling the furnace equipment, depending especially on the modifications to the production program or modifications to the materials fed into the furnace.

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